

The Relationship Between Mental Toughness and Competitive Anxiety Among West Java Canoeing Student-Athletes Participating POPNAS XVII

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Abstract. Mental toughness is an important psychological characteristic related to athletes' ability to cope with competitive demands and maintain psychological stability under pressure. However, previous studies have reported varying findings regarding the relationship between mental toughness and competitive anxiety across different athlete populations. This study investigated the association between mental toughness and competitive anxiety among West Java canoeing student-athletes participating in POPNAS XVII, including the relationship between mental toughness and the dimensions of competitive anxiety. This study employed a quantitative correlational design involving 30 West Java canoeing student-athletes selected using total sampling. Data were obtained using the Indonesian-adapted version of the Mental Toughness Index (MTIid) and the Sport Anxiety Scale-2 (SAS-2Id). Data analysis was performed using Spearman's rank correlation test. The results showed that mental toughness was significantly and negatively associated with competitive anxiety ($r_s = -0.411$; $p = 0.024$). These findings indicate that athletes with higher mental toughness tended to report lower levels of competitive anxiety. This study highlights the importance of psychological preparation, particularly the development of mental toughness, in managing competitive pressure among canoeing student-athletes. The limitation of this study is the cross-sectional design and the relatively small sample size, which limit the generalizability and causal interpretation of the findings.

Keywords: Competitive Anxiety; Mental Toughness; Student Athlete; Canoeing; Sport Psychology



INTRODUCTION

Canoeing is a sport that requires athletes to be able to integrate physical abilities, techniques, and race strategies to produce optimal performance (Mentzoni & Losnegård, 2021). On the number sprint kayak, strategy pacing, stroke rate, and stroke length has a relationship with changes in boat speed during a race (Goreham et al., 2021). At the world level, canoeing medal-winning athletes demonstrate smaller pacing variations than non-medalists, indicating that race rhythm regulation is an important component of competitive performance (Mentzoni & Losnegård, 2021). In addition to these physical, tactical and technical aspects, Psychological factors play an important role in supporting student-athletes' performance during training and competitions, particularly in managing competitive demands and psychological challenges (Akbar et al., 2024).

Psychological demands among student-athletes are complex because they must cope with pressures arising from sports participation while simultaneously fulfilling academic responsibilities (Mao, 2025). These dual demands may increase psychological challenges, particularly when athletes are required to maintain performance under competitive conditions. A systematic review of dual-career athletes indicates that demands from sports and academic environments can become additional sources of stress affecting athletes' mental health (Ramis et al., 2024). In competitive situations, stress can elicit cognitive and emotional responses that have the potential to increase or decrease athletes' performance (Wolf & Utesch, 2024). One of the psychological responses that often arise in a competitive environment is competitive anxiety, which is understood as a stress response to competition situations and relates to sports performance (Zhou et al., 2024).

Competitive anxiety can manifest through different cognitive and somatic responses in athletes (Bhardwaj & Devi, 2024). In the Sport Anxiety Scale-2 Indonesian version (SAS-2Id), sports anxiety consists of three dimensions, namely somatic anxiety, worry, and concentration disruption (Putra et al., 2021). Research (Kumbara et al., 2018) It found that 63% of the football athletes studied experienced anxiety before matches, suggesting that anxiety is a problem that can arise ahead of competitions. In the group student-athlete, competitive stress It was also found to have a positive relationship with competitive anxiety, so higher competitive pressures are associated with higher levels of competitive anxiety (Chen et al., 2026).

One of the psychological aspects related to the ability of athletes to cope with the demands of sports is mental toughness (Akbar et al., 2024). Mental toughness is a psychological construct that reflects an athlete's capacity to cope effectively with pressure, adversity, and challenging competitive situations while maintaining optimal performance. It involves the ability to regulate thoughts, emotions, and behaviors when facing demanding circumstances in sport (Gucciardi et al., 2008). In the context of Indonesia, Mental Toughness Index Indonesian version (MTIid) measures mental toughness as a one-dimensional construct through eight items that represent abilities such as self-confidence, attention regulation, emotion regulation, success orientation, ability to face difficulties, and optimism (Putra et al., 2024). Mental toughness was also reported to have a positive relationship with athlete performance, with meta-analysis results showing an overall association of $r = 0.36$ between mental toughness and sports performance (Hsieh et al., 2023). In addition to playing a role in performance, mental toughness is also thought to be related to the athlete's ability to manage psychological stress during competition (Mojtahedi et al., 2023).

Relationship between mental toughness and competitive anxiety Numerous studies have been conducted on various characteristics of athletes, but the results of previous studies show that the findings are not completely consistent. Magfiroh and Jannah in (as cited in Pramudya and Noordia 2026) found significant negative associations between mental toughness and competitive anxiety in athletes with disabilities of NPCI East Java ($r = -0.284$; $p = 0.018$), which indicates that athletes with higher mental toughness tend to experience lower competitive anxiety. However, other studies show different results. (Algipari et al., 2023) did not find a significant relationship between mental toughness and competitive anxiety in young football athletes ($r = 0.039$; $p = 0.864$). The difference in results shows that the relationship between the two psychological constructs can be influenced by the characteristics of the athlete, age, and the context of the sport being studied.

However, a broader study through meta-analysis showed a tendency for negative relationships between mental toughness and competitive anxiety. (Islam et al., 2025) report a moderate-strength negative relationship between the two variables with a value $r_{RE} = -0.320$ ($p < 0.002$) in different groups of athletes. However, variations in sample characteristics and sports context in previous studies suggest that this relationship still

needs to be studied in certain groups of athletes. (Hsieh et al., 2023) limited evidence is available regarding how mental toughness relates to different dimensions of competitive anxiety among canoeing student-athletes, particularly in the Indonesian competitive context. It also shows that the great relationship mental toughness Performance aspects can vary based on the sports category, type of sport, age of athlete, and measurement instrument used.

One group of athletes who have special psychological demands is student-athlete, as they have to carry out academic demands in conjunction with training and sports competitions (Mao, 2025). In this group, competition pressure can arise along with academic demands so that it has the potential to affect the psychological condition of athletes. In addition, the assessment competitive anxiety not only can it be done as a whole, but also through its dimensions, i.e. somatic anxiety, worry, and concentration disruption, which is a component in the structure of SAS-2Id (Putra et al., 2021). Therefore, this study aims to analyze the relationship between mental toughness and competitive anxiety on student-athlete Canoeing West Java of POPNAS XVII participants, including the relationship between mental toughness with each dimension of competitive anxiety. Based on the negative association tendencies found in most previous studies, the hypothesis of this study is that the higher the mental toughness, the lower the level competitive anxiety on student-athlete Canoeing.

METHOD

A quantitative correlational framework was applied in this research to investigate the association between mental toughness and competitive anxiety among West Java canoeing student-athletes who participated in POPNAS XVII. The participants consisted of 30 student-athletes who represented West Java Province in the national student sports competition. The sample consisted of 15 male athletes and 15 female athletes. The mean age of participants was 16.73 ± 1.28 years, while the mean training experience was 3.43 ± 1.30 years.

The inclusion criteria were: (1) registered as a canoeing athlete participating in POPNAS XVII; (2) represented West Java Province; (3) actively participated in canoeing training activities; and (4) provided informed consent to participate in the study. Data collection was conducted after the completion of POPNAS XVII. Psychological

assessment instruments were administered to obtain data regarding athletes' mental toughness and competitive anxiety levels.

Mental toughness was assessed using the Indonesian version of the Mental Toughness Index (MTIid). The instrument consisted of 8 items with a response scale ranging from 1 to 7 and demonstrated good internal consistency reliability ($CR = 0.864$; $\alpha = 0.862$). Competitive anxiety was measured using the Indonesian version of the Sport Anxiety Scale-2 (SAS-2Id), consisting of 15 items with a response scale ranging from 1 to 4. The SAS-2Id evaluates three dimensions of competitive anxiety: somatic anxiety, worry, and concentration disruption.

Statistical procedures consisted of descriptive analysis and hypothesis testing methods. Descriptive analysis was performed by calculating the minimum, maximum, mean, and standard deviation values of each variable. The normality of data distribution was assessed using the Shapiro–Wilk test. Since the data did not fully meet the assumption of normality, the relationship between mental toughness and competitive anxiety was analyzed using Spearman's rank correlation test. Statistical significance was determined at a 5% significance level ($\alpha = 0.05$), where a p -value < 0.05 indicated a significant relationship.

RESULT AND DISCUSSION

Table 1. Descriptive Statistics of Mental Toughness

Variable	<u>N</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>SD</u>
Mental Toughness	30	31	56	49.17	6.32

The descriptive statistics of mental toughness are presented in Table 1. The results showed that the mental toughness scores of the 30 canoeing student-athletes participating in POPNAS XVII ranged from 31 to 56, with a mean score of 49.17 and a standard deviation of 6.32. The variation between the minimum and maximum scores indicates that participants had different levels of mental toughness. The standard deviation value shows that the distribution of mental toughness scores among athletes was relatively varied, although most scores remained within a similar range around the mean value.

Table 2. Descriptive Statistics of the Competitive Anxiety Dimension

Dimension	<u>N</u>	<u>Min</u>	<u>Max</u>	<u>Mean</u>	<u>SD</u>
Somantic Anxiety	30	5	13	8.67	2.06
Worry	30	5	19	11.00	4.03

The descriptive statistics of competitive anxiety dimensions are presented in Table 2. The results showed variations in the three dimensions of competitive anxiety, including somatic anxiety, worry, and concentration disruption. Somatic anxiety scores ranged from 5 to 13, with a mean score of 8.67 and a standard deviation of 2.06. The worry dimension showed scores ranging from 5 to 19, with a mean score of 11.00 and a standard deviation of 4.03. Meanwhile, concentration disruption scores ranged from 5 to 15, with a mean score of 8.73 and a standard deviation of 2.92.

Among the three dimensions, worry showed the highest variation based on the standard deviation value, indicating greater differences among athletes in experiencing cognitive anxiety responses. In contrast, somatic anxiety showed the lowest variation, suggesting that physiological anxiety responses among participants were relatively more consistent compared with the other dimensions.

Table 3. Normality Test Results

Variabel	<u>Shapiro-Wilk</u>	<u>Sig.</u>	<u>Remarks</u>
Mental Toughness	0,885	0,004	Abnormal
Somantic Anxiety	0,942	0,105	Normal
Worry	0,951	0,184	Normal
Concentration Disruption	0,920	0,028	Abnormal

The normality test results using the Shapiro–Wilk test are presented in Table 3. The results showed that the mental toughness variable ($p = 0.004$) and concentration disruption dimension ($p = 0.028$) did not meet the normality assumption ($p < 0.05$). Meanwhile, somatic anxiety ($p = 0.105$) and worry ($p = 0.184$) showed a normal distribution because their significance values were greater than 0.05.

Table 4. The Relationship Between Mental Toughness and Competitive Anxiety

Variabel	<u>N</u>	<u>rs</u>	<u>p-value</u>	<u>Remarks</u>
Mental Toughness - Competitive Anxiety	30	-0.411	0.024	Negative Significant

The relationship between mental toughness and competitive anxiety was analyzed using Spearman's rank correlation test because the data did not meet the assumption of normality. As presented in Table 4, the analysis showed a significant negative relationship between mental toughness and competitive anxiety among West Java canoeing student-athletes participating in POPNAS XVII ($rs = -0.411$, $p = 0.024$). The

correlation coefficient indicated a moderate relationship between the variables. The negative correlation indicates that athletes with higher mental toughness tended to show lower levels of competitive anxiety.

Table 5. Correlation Test Results of Mental Toughness with Competitive Anxiety Dimension

Variable Relationships	<u>rs</u>	<u>p-value</u>	<u>Remarks</u>
Mental Toughness - Somantic Anxiety	-0,397	0,030	Negative Significant
Mental Toughness - Worry	-0,397	0,030	Negative Significant
Mental Toughness - Concentration Disruption	-0,342	0,065	Negative Non Significant

The relationship between mental toughness and the dimensions of competitive anxiety was analyzed using Spearman's rank correlation test. As presented in Table 5, mental toughness showed significant negative relationships with somatic anxiety ($r_s = -0.397$, $p = 0.030$) and worry ($r_s = -0.379$, $p = 0.039$). Meanwhile, the relationship between mental toughness and concentration disruption showed a negative direction but was not statistically significant ($r_s = -0.342$, $p = 0.065$).

DISCUSSION

This study found that mental toughness was significantly and negatively associated with competitive anxiety among West Java canoeing student-athletes participating in POPNAS XVII. This finding indicates that athletes with higher levels of mental toughness tended to experience lower levels of competitive anxiety. The results highlight the importance of psychological characteristics in helping athletes cope with competitive pressure. In canoeing, athletes are required not only to possess physical abilities and technical skills but also to maintain emotional stability, confidence, and focus during competition. Therefore, mental toughness may represent an important psychological resource that supports athletes in managing competitive demands.

The current results align with previous evidence indicating that mental toughness is inversely associated with competitive anxiety. (Islam et al., 2025) through a meta-analysis study involving athletes from various sports, reported that mental toughness was negatively associated with athlete anxiety, indicating that athletes with stronger mental toughness generally experienced lower levels of competitive anxiety. This finding supports the present study because a similar relationship was observed among canoeing

student-athletes competing at the national level. Furthermore, (Utomo et al., 2018) found that mental toughness was negatively related to competitive anxiety among volleyball athletes. Their study showed that athletes with stronger mental toughness were better able to manage competitive pressure, resulting in lower anxiety levels.

Similar findings were also reported by (Annisa & Kurniawan, 2022) among professional basketball athletes, showing that mental toughness played an important role in managing competitive anxiety. They explained that athletes with stronger mental toughness were more capable of maintaining self-confidence and controlling psychological pressure during competition. In addition, (Nissa & Soenyoto, 2021) found a significant association between mental toughness and competitive anxiety among martial arts athletes in Central Java. Although these studies involved different sports, their findings support the present study by demonstrating that psychological characteristics contribute significantly to athletes' ability to cope with competitive situations.

However, this study provides further insight by examining competitive anxiety through three specific dimensions: somatic anxiety, worry, and concentration disruption. The results showed that mental toughness was significantly associated with somatic anxiety and worry, whereas the relationship with concentration disruption was not statistically significant. These different patterns suggest that mental toughness may not influence all dimensions of competitive anxiety in the same manner.

The significant relationship between mental toughness and somatic anxiety indicates that athletes with stronger mental toughness may have greater ability to regulate physiological responses during competition, such as tension, nervousness, and physical discomfort. This finding is consistent with (Liew et al., 2019), who explained that mental toughness is related to athletes' ability to manage stress and maintain psychological stability in demanding situations. Similarly, (Stamatis et al., 2020) emphasized that mental toughness development is associated with emotional regulation and psychological readiness, allowing athletes to remain composed when facing competitive challenges.

The significant relationship between mental toughness and worry suggests that mentally tough athletes may be better able to manage negative thoughts, concerns about performance outcomes, and cognitive pressure during competition. This finding supports the explanation provided by (Doron et al., 2021), who stated that athletes' responses to

competitive stress are influenced by how they evaluate stressful situations, apply coping strategies, and regulate emotional responses. Athletes with stronger psychological resources may perceive competitive demands as challenges rather than threats, allowing them to maintain more adaptive cognitive responses.

In contrast, the relationship between mental toughness and concentration disruption was not statistically significant in this study. This finding suggests that attentional control during competition may involve additional factors beyond general mental toughness. Concentration ability can also be influenced by competitive experience, technical preparation, environmental conditions, and specific attentional skills. Therefore, although mentally tough athletes may demonstrate better emotional regulation and reduced anxiety symptoms, maintaining concentration under pressure may require specific psychological training targeting attentional control. This finding extends previous research by suggesting that competitive anxiety should not be viewed as a single psychological response because each dimension may demonstrate different relationships with athletes' psychological characteristics. This interpretation is supported by (Rocha & Osório, 2018) who highlighted that competitive anxiety is influenced by multiple factors, including athlete characteristics and sport context.

The findings of this study provide important theoretical and practical implications. From a theoretical perspective, this study strengthens the understanding that competitive anxiety is a multidimensional construct and that psychological characteristics may relate differently to each anxiety component. The results indicate that mental toughness has stronger associations with physiological and cognitive anxiety responses, particularly somatic anxiety and worry, rather than concentration disruption. From a practical perspective, coaches and sport practitioners, particularly in canoeing, should consider integrating psychological training into athlete development programs. Training programs focusing on emotional regulation, confidence development, coping strategies, and attentional control may help athletes improve psychological readiness and better manage pressure during high-level competitions.

CONCLUSION

This study showed that there was a significant negative relationship between mental toughness and competitive anxiety in West Java canoeing student-athletes participating in POPNAS XVII ($r_s = -0.411$; $p = 0.024$). This means that the higher the

mental toughness of the athlete, the lower the tendency to competitive anxiety they experience. In each dimension, mental toughness was negatively and significantly associated with somatic anxiety ($r_s = -0.397$; $p = 0.030$) and worry ($r_s = -0.397$; $p = 0.030$), while the association with concentration disruption showed a negative but not significant direction ($r_s = -0.342$; $p = 0.065$). These findings suggest that mental toughness is primarily related to low physical anxiety responses and cognitive concerns in athletes.

This study was limited to a relatively small sample and only involved West Java canoeing student-athletes participating in POPNAS XVII so the generalization of results needs to be done carefully. Further research is suggested to involve a larger number of respondents, more diverse sports, and consider other psychological factors that can be related to competitive anxiety, especially concentration disorders.

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